Improved Heat Sink Element Coupling Structure

BACKGROUND OF THE INVENTION

1) FIELD OF THE INVENTION

The invention herein relates to heat dissipation fixtures, specifically an improved heat sink element coupling structure capable of total mechanical engagement that cannot be unintentionally dislodged, the coupling structure of which is disposed on a single side of each heat sink element to interconnect a plurality thereof into a heat sink.

2) DESCRIPTION OF THE PRIOR ART

In conventional "assembly-type" heat sinks, such as those disclosed in patent application No. 407753, 460110, 468931, 484704, and 516794 in the Taiwan Patent Bulletin, the coupling structure for achieving interconnection consists of a "stack fit" approach. As a result, a coupling structure must be disposed at the upper and lower edge of each individual heat sink element plate so they can be interconnected into a heat sink. If the coupling structure is only disposed on the lower lateral edge of every individual heat sink element plate, but not on the upper lateral edge, they cannot be conjoined to the heat sink mounting plate. Since the coupling structure of conventional head sink must be situated on

the upper and lower edge of each single heat sink element plate, only rectangular shaped heat sinks can be assembled which seriously limits profile variety and performance range. Additionally, since the coupling structure of the said conventional heat sink only consists of a "stack fit" approach for interconnection that is not "fully engaged", loosening and/or dislodging easily occurs during assembly or when installed and utilized, demonstrating that the prior art is entirely impractical. In view of the said situation, the two applicants of the invention herein conducted extensive research and testing to develop the improved heat sink element coupling structure of the present invention.

SUMMARY OF THE INVENTION

The objective of the invention herein is to provide an improved heat sink element coupling structure capable of total mechanical engagement that cannot be unintentionally dislodged and, furthermore, that is not easily loosened nor shifted during assembly or while installed and in use.

Another objective of the invention herein is to provide an improved heat sink element coupling structure, wherein only one or more coupling structure on the lateral edge of single heat sink elements enable interconnection into a heat sink.

The improved heat sink element coupling structure of the invention herein is comprised of a minimum of one or more folded appendages that are formed by

bending along the upper or lower lateral edges, the middle, or other suitable position of a single heat sink element or along the two sides of one lateral edge or middle position of a single heat sink element; an opening disposed at the confluence of the said folded appendage and the said single heat sink element plate that penetrates the said folded appendage to form a perforated construct; and a linking member that extends outward from the said folded appendage and, furthermore, is positioned at the distal extremity of the said single heat sink element plate, the features of which are: The said linking member also has two lock tabs along its two sides that extend from the two sides at the leading extremity of the said linking member; during interconnection, the lock tabs along the two sides of the linking member on a said single heat sink element are articulated into an O shape and engaged into the opening of another immediately adjacent single heat sink element and, furthermore, the said linking member and the said two lock tabs at its two sides are formed into a horizontal S shape or an inverted horizontal S-shaped arrangement such that they are crimped onto the said other single heat sink element plate and also firmly secured against the two lateral edges of the opening to prevent unintentional dislodging. As such, during assembly or while installed and in use, the present invention is not easily loosened or unintentionally dislodged; at the same time, since only one lateral edge of the single heat sink elements enables interconnection for assembling heat sinks, they can be connected

into an inclined plane-type, notched or variable height, wave-shaped heat sinks, or even connected into cylindrical-type, rectangular, tubular, ovoid tubular-shaped, polygonal tubular-shaped heat sink; and also connected to single heat sink element plates having differing heights (widths) to assemble an unevenly profiled heat sink, thereby accommodating a range of varying arrangements to meet the different design requirements and demands of manufacturers.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an isometric drawing of the invention herein.

Figure 2 is an isometric drawing of the invention herein after interconnection.

Figure 3 is an orthographic drawing of the invention here when it is in the flat state.

Figure 4 is an isometric drawing of the invention herein that illustrates the interconnection process.

Figure 5 is an isometric drawing of another embodiment of the invention herein.

Figure 6 is an isometric drawing of the yet another embodiment of the invention herein.

Figure 7 is an isometric drawing of the assembled first embodiment heat

sink of the invention herein.

Figure 8 is an isometric drawing of the assembled second embodiment heat sink of the invention herein.

Figure 9 is an isometric drawing of the assembled third embodiment heat sink of the invention herein.

Figure 10 is an isometric drawing of the assembled fourth embodiment heat sink of the invention herein.

Figure 11 is an isometric drawing of the assembled fifth embodiment heat sink of the invention herein.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, the isometric drawing of the invention herein, the drawing depicts a coupling structure 11 at the left corner section on the upper edge of a single heat sink element 1 plate 10 that is symmetrically or correspondingly disposed on the coupling structure 11 at the right side of the lower edge or the left or right side of the lower edge of the said single heat sink element 1 plate 10. The said coupling structure 11 is comprised of a minimum of one or more folded appendages 12 of appropriate length that are formed by bending along the upper or lower edge, the middle, or other suitable position of the single heat sink element 1 plate 10; an opening 121 disposed at the confluence of the said folded appendage

12 and the said single heat sink element 1 plate 10 that penetrates the said folded appendage 12 to form a perforated construct; and a linking member 13 that extends outward from the said folded appendage 12 and, furthermore, is positioned at the distal extremity of the said single heat sink element 1 plate 10. The said linking member 13 also has two lock tabs 131 along its two sides that extend from the two sides at the leading extremity of the said linking member 13.

Referring to FIG. 3, the improved structure heat sink element coupler is pictured in a flat state when fed as material during the first step of the punch fabrication process, wherein the fed material consists of the folded appendage 12 of the coupling structure 11, its opening 121 as well as the linking member 13 lock tabs 131 along its two sides, that is contiguous to one lateral edge of the heat sink element 1 plate 10; next, as indicated in FIG. 4, the lock tabs 131 along the two sides of the linking member 13 at the outer side of the said folded appendage 12 are punched into an O shape in preparation for the interconnection of each single heat sink element 1 plate 10, as shown in FIG. 2, wherein when a few or numerous heat sink elements 1 are actually interconnected, the lock tabs 131 along the two sides of the linking member 13 must be articulated into a O shape before the folded appendage 12 is bent along the one lateral edge of the said single heat sink element 1 plate 10, with the bend executed such that it is perpendicular to the said heat sink element 1 plate 10 in the manner shown in FIG. 4.; as the folded appendage 12 is

bent, the lock tabs 131 along the two sides of the linking member 13 at its outer side, as shown in FIG. 2, are fitted into the opening 121 through the folded appendage 12 of the single heat sink element 1 in front, the said two lock tabs 131 are pressed into a horizontal S shape or an inverted horizontal S-shaped arrangement by a downward tooling stroke to complete the interconnection of each single heat sink element 1 plate 10 to another single heat sink element 1 plate 10. The said two lock tabs 131 are also crimped onto the said single heat sink element 1 plate 10 to the front and both are also firmly secured against the two lateral edges of the opening 121 in the folded appendage 12 of the said front single heat sink element 1 such that they are not easily loosened and, furthermore, cannot be unintentionally dislodged; the said punch fabrication task consists of a continuous punch press and molding process and, with the exception of the material feed and punch fabrication steps, each punch executed thereafter fashions a heat sink element 1 and completes the interconnection of the heat sink element 1 to the front in a punching process that is quite simple and quick which facilitates rapid mass production.

Referring again to FIG. 5, since the coupling structure 11 is capable of total mechanical engagement, not easily loosened and, furthermore, cannot be unintentionally dislodged following the interconnection of each single heat sink element 1 plate 10, a lock tab 131 is only needed on one side, either the left side or

the right side, at the leading extremity of the linking member 13, to similarly enable the efficient interconnecting of two single heat sink element 1 plates 10.

Referring to FIG. 6, the drawing illustrating another different embodiment of the lock tabs 131a on the two sides of the linking member 13 of the coupling structure 11 of the invention herein, the flat, rectangular or U-shaped lock tabs 131 shown in FIG. 1 are modified into triangular lock tabs 131a, similarly enabling the efficient interconnecting of two single heat sink element 1 plates 10.

Finally, referring to FIG. 7, FIG. 8, FIG. 9, FIG. 10, and FIG. 11, based on the general embodiment herein, when the coupling structure 11 of the invention herein is likewise disposed on the upper and lower edges of single heat sink element 1 plates 10, they can be connected, as indicated in FIG. 7, into a conventional rectangular heat sink 2; when the coupling structure 11 of the invention herein is disposed on the lower edge or only on one lateral edge of single heat sink element 1 plates 10, then they can be connected into an inclined plane-type heat sink 2a (as shown in FIG. 8), or notched, variable height, or wave-shaped heat sink 2b (as shown in FIG. 9), or even connected into a cylindrical-type heat sink 2c (as shown in FIG. 10) or a rectangular, tubular, ovoid tubular-shaped, or polygonal tubular-shaped heat sink (not shown in the drawings); and also connected, as shown in FIG. 11, to single heat sink element 1 plates 10 having differing heights (widths) to assemble an unevenly profiled heat sink, thereby

accommodating a range of varying arrangements to meet the different design requirements and demands of manufacturers.